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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

*For Supervisor's use only*

# Level 2 Science, 2007

## 90768 Use physics concepts and principles to describe the behaviour of light

Credits: Four
2.00 pm Wednesday 28 November 2007

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

| *For Assessor's use only* | **Achievement Criteria** | | |
|---|---|---|---|
| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| Use physics concepts and principles to describe the behaviour of light. | Use physics concepts and principles to explain the behaviour of light. | Use physics concepts and principles to discuss the behaviour of light. |
| **Overall Level of Performance** | | |

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You are advised to spend 40 minutes answering the questions in this booklet.

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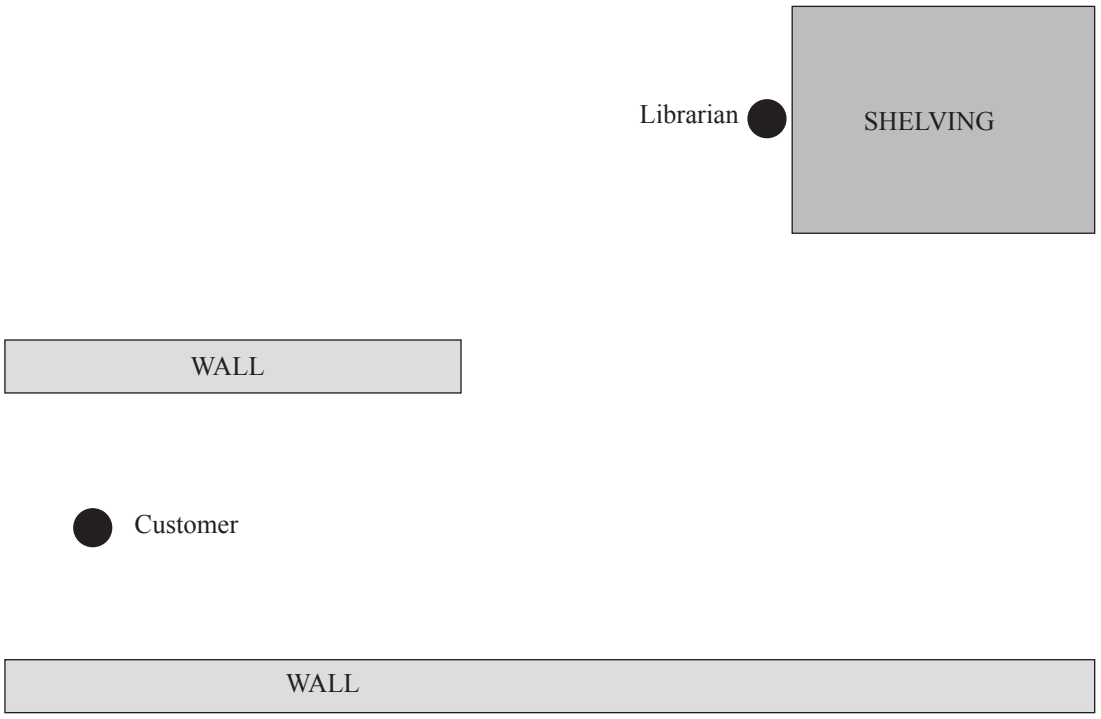
## QUESTION ONE: PLANE MIRROR

In a library, a librarian has to both serve customers and shelve books. The problem is that the customer is not completely visible from the shelves. It is suggested that a plane (flat) mirror on a wall would solve this problem.

(a) In the diagram below draw a mirror in a position on a wall so that the **librarian** can see the **customer** while the two of them are in the positions shown.

(b) Show, by the use of a **ray diagram** that the customer is now visible to the librarian.

(c) Mark accurately the position of the customer's **image**.



## QUESTION TWO: LENS

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(a) Name the type of **lens** required in a camera to form a **real** image on the film.

_____

(b) An object 25 mm tall is photographed using a 50 mm focal length lens. The object is 120 mm from the camera lens.

Draw a scale ray diagram on the opposite page to determine the **size, distance from lens, and nature of the image** on the film.

Using your **scale diagram**, **measure** the:

(i) Size of the image = _____ mm.

(ii) Distance of the image from lens = _____ mm.

And **describe** the:

(iii) Nature of image: _____ , _____ , _____ .

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QUESTION TWO (b)

## QUESTION THREE: COLOUR

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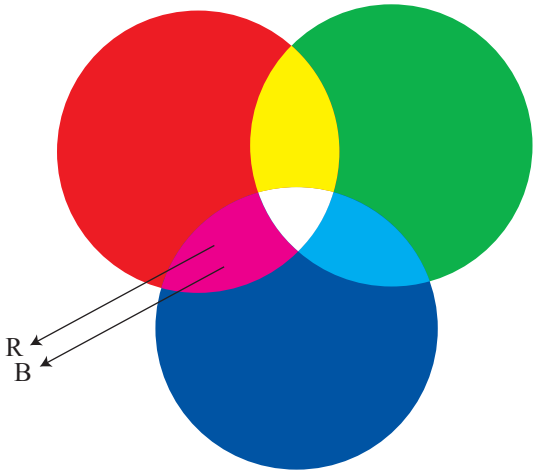
The three primary colours, red, green and blue, are projected onto a screen in a darkened room and allowed to overlap as shown in the diagram.



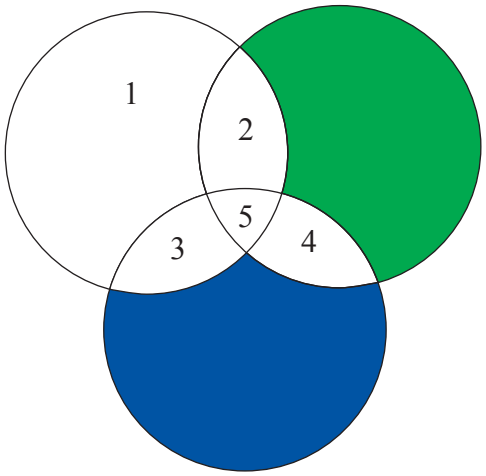

Where the primary colours overlap, they add together to form the colours magenta, yellow, cyan, and white. We see these new colours because of the different combinations of **R**ed and/or **G**reen and/or **B**lue light rays emitted by the new colours.

(a) Draw rays from the *yellow*, *cyan* and *white* to show the combinations of **R**ed and/or **G**reen and/or **B**lue that produce these colours. The light rays coming from magenta have been drawn for you.

(b) The Red colour is removed so that only the Blue and Green are projected.

Label the numbers 1 – 5 below with their resulting colours.

| Number | Colour |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |



(c) **Discuss** how **primary** filters work. Use red, blue and green filters to explain your answer.

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## QUESTION FOUR: PRISMS

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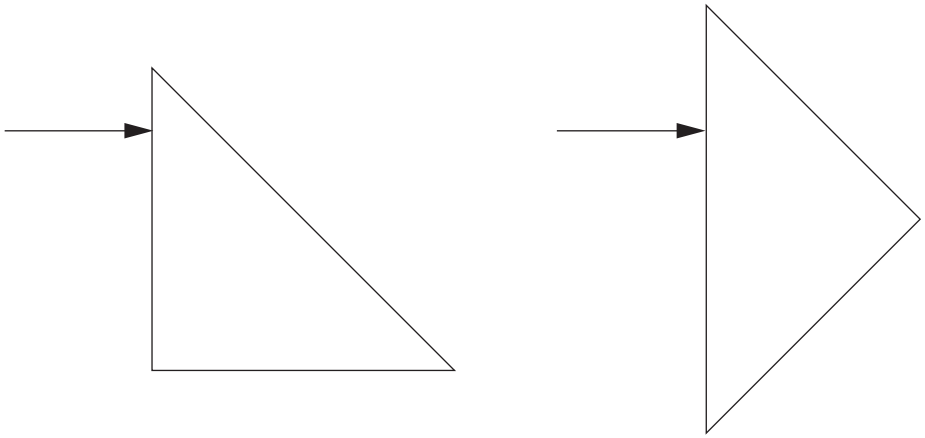
(a)



(i) Complete the above two diagrams by showing how each light ray reflects in each of these right-angle isosceles (two sides equal) glass prisms.

(ii) Explain why reflection occurs inside these prisms.

(b) The diagram shows a ray of white light passing into another glass prism.

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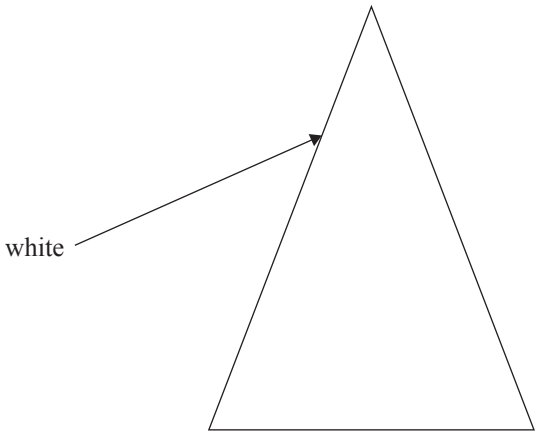
**Discuss** what happens to the light ray and why. (It is recommended that you complete the light ray's path in the diagram to help your discussion.)



**Extra paper for continuation of answers if required.**
**Clearly number the question.**

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| Question number | |
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